

CLAIMS

1. A dry etching method characterized in that a resist film formed on a substrate is irradiated with radiation having a wavelength of not more than 195 nm to form a resist pattern having a minimum line width of not more than 200 nm, and the substrate having the resist pattern formed thereon is subjected to dry etching using a fluorine-containing compound having 4 to 6 carbon atoms and at least one unsaturated bond as an etching gas.

2. The dry etching method according to claim 1, wherein the resist film is formed from a high molecular weight compound containing 0% to 10% by weight of repeating units having an aromatic ring structure.

3. The dry etching method according to claim 1 or 2, wherein the fluorine-containing compound having 4 to 6 carbon atoms and at least one unsaturated bond is selected from perfluoro-2-butyne and perfluoro-2-pentyne.

4. The dry etching method according to claim 1 or 2, wherein the fluorine-containing compound having 4 to 6 carbon atoms is perfluoro-2-pentyne.

5. The dry etching method according to claim 1 or 2, wherein the fluorine-containing compound having 4 to 6 carbon atoms and at least one unsaturated bond is at least one kind of fluoropentene selected from 1,1,1,2,4,4,5,5,5-nonafluoro-2-pentene, 1,1,1,3,4,4,5-nonafluoro-2-pentene and perfluoro-2-pentene.

6. The dry etching method according to any one of claims 1 to 5, wherein the dry etching is carried out under irradiation with plasma having a plasma density of at least 10^{10} ions/cm³.

7. A dry etching gas comprised of a fluorine-containing compound having 4 to 6 carbon atoms and at least one unsaturated bond, and used for dry etching for a resist film forming a resist pattern having a minimum line width of not more than 200 nm at irradiation with radiation having a wavelength of not more than 195 nm.

8. The dry etching gas according to claim 7, wherein the fluorine-containing compound having 4 to 6 carbon atoms and at least

one unsaturated bond is selected from perfluoro-2-butyne and perfluoro-2-pentyne.

9. The dry etching gas according to claim 7, wherein the fluorine-containing compound having 4 to 6 carbon atoms and at least one unsaturated bond is perfluoro-2-pentyne.

10. The dry etching gas according to claim 7, wherein the fluorine-containing compound having 4 to 6 carbon atoms and at least one unsaturated bond is at least one kind of fluoropentene selected from 1,1,1,2,4,4,5,5,5-nonafluoro-2-pentene, 1,1,1,3,4,4,5-nonafluoro-2-pentene and perfluoro-2-pentene.

11. A process for producing perfluoro-2-pentyne characterized in that a 1,1,1-trihalo-2,2,2-trifluoroethane is allowed to react with pentafluoropropionaldehyde to give a 2-halo-1,1,1,4,4,5,5,5-octafluoro-2-pentene, and the thus-produced 2-halo-1,1,1,4,4,5,5,5-octafluoro-2-pentene is dehydrohalogenated.

12. The process for producing perfluoro-2-pentyne according to claim 11, wherein the 1,1,1-trihalo-2,2,2-trifluoroethane is 1,1,1-trichloro-2,2,2-trifluoroethane.